Zoonotic Disease

Kelli M. Almes, DVM, Diplomate ACVP
Associate Professor/Anatomic Pathologist
Director, Necropsy & Client Services

Kansas State Veterinary Diagnostic Laboratory

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Kansas State Veterinary Diagnostic Laboratory

Laboratory Overview

Kansas State Veterinary Diagnostic Laboratory

- Unit within Department of Diagnostic Medicine/ Pathobiology in the College of Veterinary Medicine, Kansas State University
- Accredited by the American Association of Veterinary Laboratory Diagnosticians
- BSL-2 Laboratory
- Annually
  - Approx. 120,000 accessions
    - 236,000 patients
    - 312,000 tests

Kansas State Veterinary Diagnostic Laboratory

- Microbiology (Bacteriology & Mycology)
- Clinical Immunology
- Clinical Pathology
- Comparative Hematology
- Histopathology/Immunohistochemistry
- Molecular Diagnostics (Service, R&D, Sequencing)
- Necropsy/Pathology
- Parasitology
- Rabies
- Serology
- Toxicology
- Virology

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KSVDL

- Microbiology
  - Aerobic, anaerobic, fungal culture
    - *Brucella canis*, *Salmonella sp, Campylobacter*
- Clinical Pathology
  - CBC, Chem panel, urinalysis, blood smear examination
- Histopathology/IHC
  - Tumor markers, infectious disease
    - West Nile virus, Tularemia
- Molecular Diagnostics
  - PCR testing- small sample requirement, rapid turn around
    - Leptospriosis, *Brucella canis*, *Campylobacter*, Influenza
- Necropsy

KSVDL

- Parasitology
  - Canine and feline roundworms, hookworms, Cryptosporidium
- Rabies
  - Testing of suspect animals and human serological testing
- Serology
  - Lyme disease, Brucellosis, Leptospirosis, Toxoplasma

My journey

- Grew up in Hope, KS
- Undergraduate, DVM, Pathology Residency
- Pathologist at KSVDL since September 2008

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Why is this important?

Zoonotic Disease

- Infectious diseases that are spread between animals and people.
  - Direct contact
  - Indirect contact
  - Vector-born
  - Foodborne

Zoonotic Disease

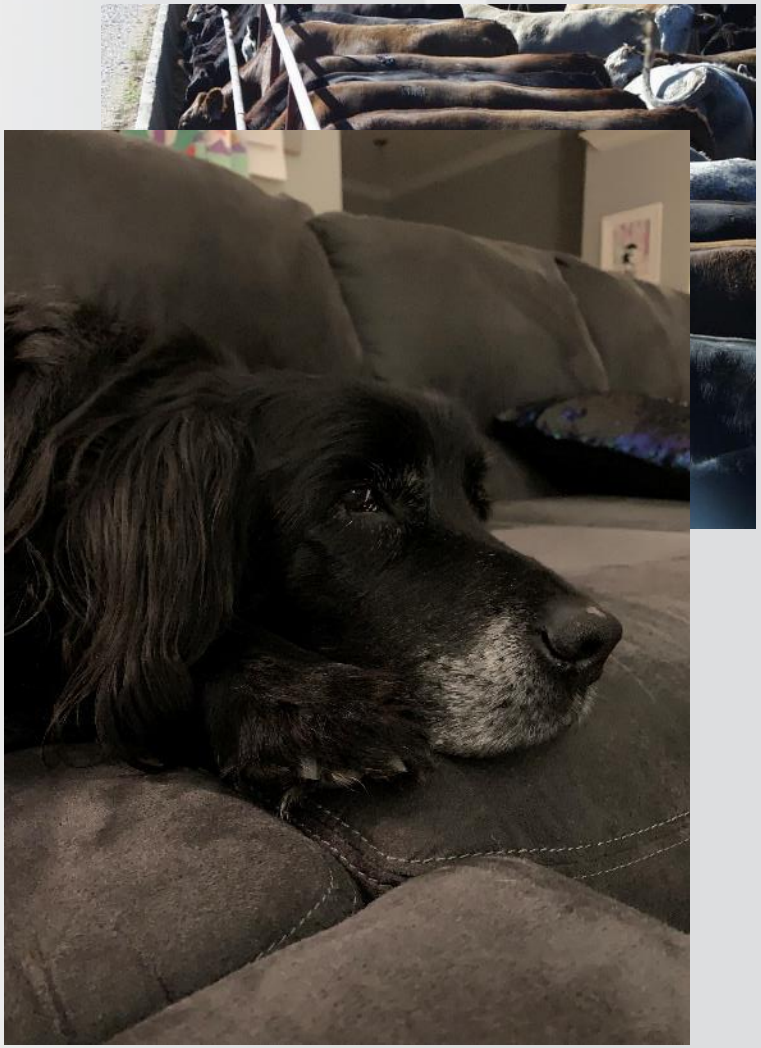
- Who is most at risk?
  - Immunocompromised

Antimicrobial Stewardship

- What does this mean?
  - Coordinated efforts that promotes the appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms. Association for Professions in Infection Control and Epidemiology
- What does this mean for the veterinary /animal industry?
  - Veterinary Feed Directive
  - AVMA Task Force for Companion Animal Practice

FDA Center for Veterinary Medicine

- Supporting Antimicrobial Stewardship in Veterinary Settings: Goals for Fiscal Years 2019-2023
  - Action 1.2.3 Develop and implement strategy for promoting antimicrobial stewardship in companion animals.
  - Action 3.2.4 Build and increase domestic capacity to monitor antimicrobial resistance in animal and zoonotic pathogens to include companion animals and animal feed.



Companion Animal

- Methicillin-resistant Staphylococcus pseudintermedius (MRSP)
  - Commonly found on the skin, mouth, nose, or GI tract of approx. 50% of cats and dogs
  - Common ear and skin infections, secondary invader
  - Can spread from dog/cat to human

- Methicillin-resistant Staphylococcus aureus (MRSA)
  - Commonly found on the skin, mouth, nose, or GI tract of humans
  - Common skin infections, secondary invader
  - Can spread from human to dog/cat
  - Estimated annual number of human deaths: 11,000

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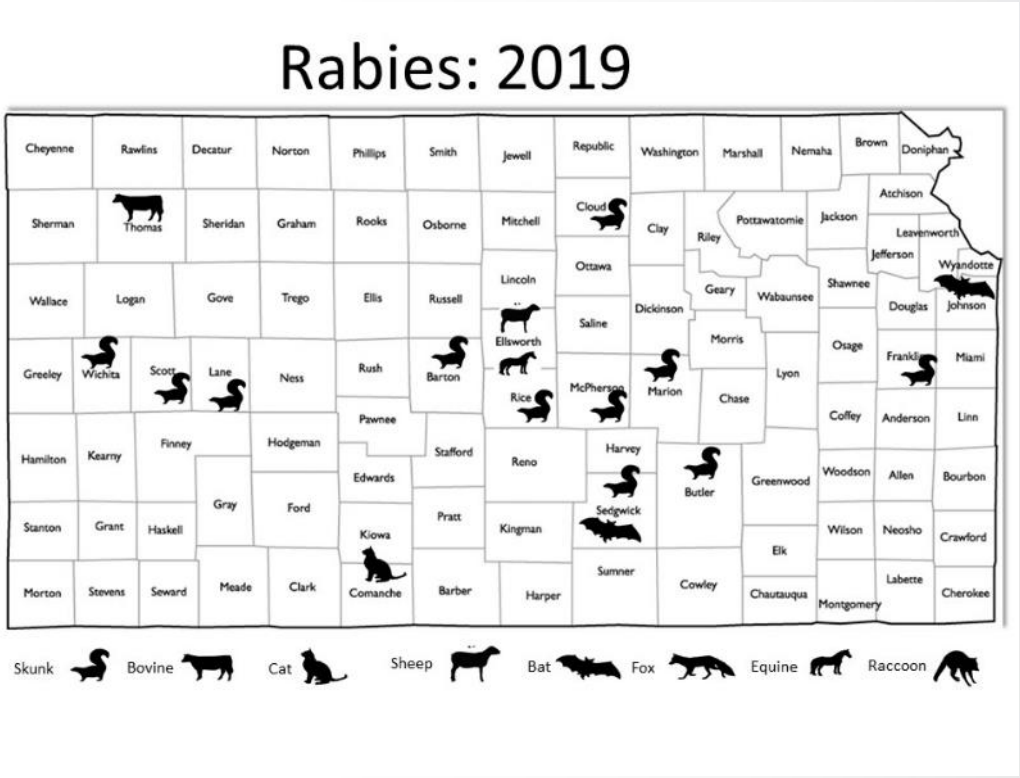
Zoonoses Everywhere (potentially)

Rabies Virus



- Direct Fluorescent Antibody Testing
- 2018
  - 1079 animals tested
  - 29 positive
  - 26 unsuitable
  - Bat, Horse, Cow, Fox, Raccoon, Skunk (21)
- Submission form
  - Human exposure
  - Animal exposure

Salmonella in hedgehogs

CDC and public health officials in several states are investigating a multistate outbreak of *Salmonella* infections linked to contact with pet hedgehogs.

Latest Outbreak Information

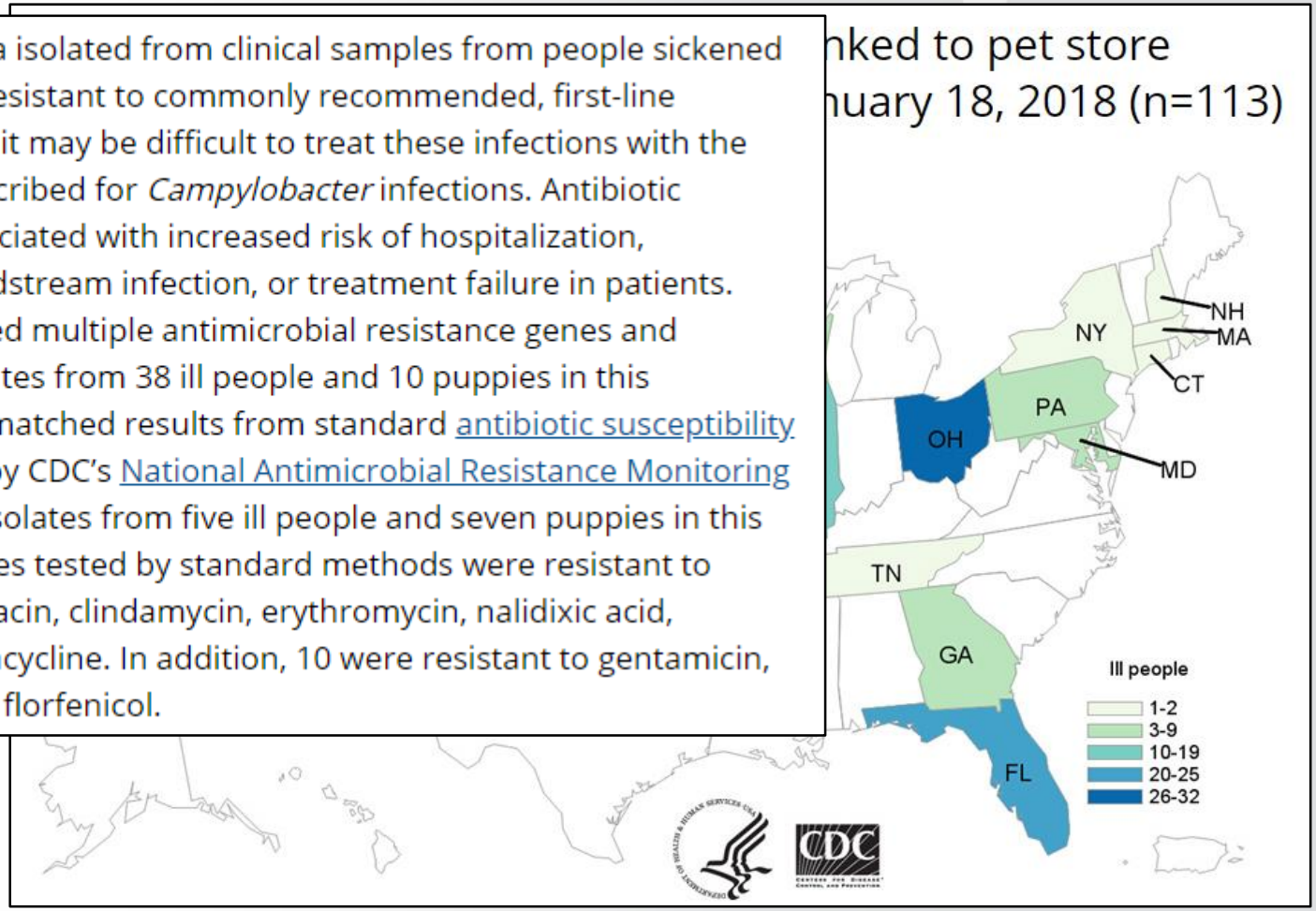
- Since the last update on March 29, 2019, illnesses in an additional 10 people and six states have been added to this investigation.
- Twenty-seven people infected with the outbreak strain of *Salmonella* Typhimurium have been reported from 17 states.
  - Two people were hospitalized. No deaths have been reported.
  - Forty-two percent are children aged 12 or younger.
- Epidemiologic and laboratory evidence indicate that contact with pet hedgehogs is the likely source of this outbreak.
  - In interviews, 18 (90%) of 20 ill people reported contact with a hedgehog.
  - A common source of hedgehogs has not been identified.
- The outbreak strain making people sick was identified in samples collected from 10 hedgehogs in Minnesota, including 5 hedgehogs from the homes of five ill patients.

At A Glance

- Reported Cases: 27
- States: 17
- Hospitalizations: 2
- Deaths: 0

Campylobacter in puppies

Campylobacter bacteria isolated from clinical samples from people sickened in this outbreak were resistant to commonly recommended, first-line antibiotics. This means it may be difficult to treat these infections with the antibiotics usually prescribed for *Campylobacter* infections. Antibiotic resistance may be associated with increased risk of hospitalization, development of a bloodstream infection, or treatment failure in patients. Using WGS, we identified multiple antimicrobial resistance genes and mutations in most isolates from 38 ill people and 10 puppies in this outbreak. This finding matched results from standard antibiotic susceptibility testing methods used by CDC's National Antimicrobial Resistance Monitoring System laboratory on isolates from five ill people and seven puppies in this outbreak. The 12 isolates tested by standard methods were resistant to azithromycin, ciprofloxacin, clindamycin, erythromycin, nalidixic acid, telithromycin, and tetracycline. In addition, 10 were resistant to gentamicin, and 2 were resistant to florfenicol.



Raw Pet Food Diets

- *Salmonella & Listeria monocytogenes*
- Can cause infection in dogs or humans
  - Direct contact
  - Indirect contact
  - Foodborne
- FDA- “FDA does not believe feeding raw pet foods to animals is consistent with the goal of protecting the public from significant health risks.”

Cute but Contaminated

Infection From Turtles and Geckos

In four outbreaks between Jan. 16, 2015, and April 8, 2016, 133 people from 26 states were infected with Salmonella, according to the Centers for Disease Control and Prevention (CDC). Although there were no deaths associated with these *Salmonella* outbreaks, 38 people were hospitalized (41% of them were children age 5 or younger).

The investigation showed that shortly before many of the people became ill, they were exposed to a small turtle by touching, feeding, cleaning the habitat, or changing the water in the tank. Almost half of the people who had contact with small turtles reported buying and handling small turtles from a street vendor or receiving the turtle as a gift.

Geckos also can be the source of a *Salmonella* outbreak. Between Jan. 1, 2014, and June 16, 2015, CDC received reports of 22 people in 17 states who were infected with *Salmonella* associated with geckos. Geckos commonly live in aquariums or fish tanks, and could be carrying *Salmonella* but appear healthy and show no signs of illness.

Brucellosis

- Multiple species = All potentially zoonotic

Brucellosis is an infectious disease caused by bacteria.

People can get the disease when they are in contact with infected animals or animal products contaminated with the bacteria. Animals that are most commonly infected include sheep, cattle, goats, pigs, and dogs, among others.

Exposures to Drug-Resistant Brucellosis Linked to Raw Milk

Food Safety Alert

February 8, 2019

The CDC and state health officials are investigating potential exposures to *Brucella* RB51 in 19 states, connected to consuming raw (unpasteurized) milk from Miller's Biodiversity Farm in Quarryville, Pennsylvania.

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Tularemia

Tularemia- Francisella tularensis

- Feline Disease
  - Fever, anorexia, dehydration, lymphadenopathy, oral ulcerations, abscesses, icterus, death
  - Can also infect dogs, sheep, rodents, lagomorphs, NHP
  - Cats often treated with antibiotics prior to death if clinical signs noted
  - Often no clinical history provided

American Dog Tick
(*Dermacentor variabilis*)

<https://identify.us.com/_Media/60044980img_6565s.jpeg>

Lone Star Tick
(*Amblyomma americanum*)

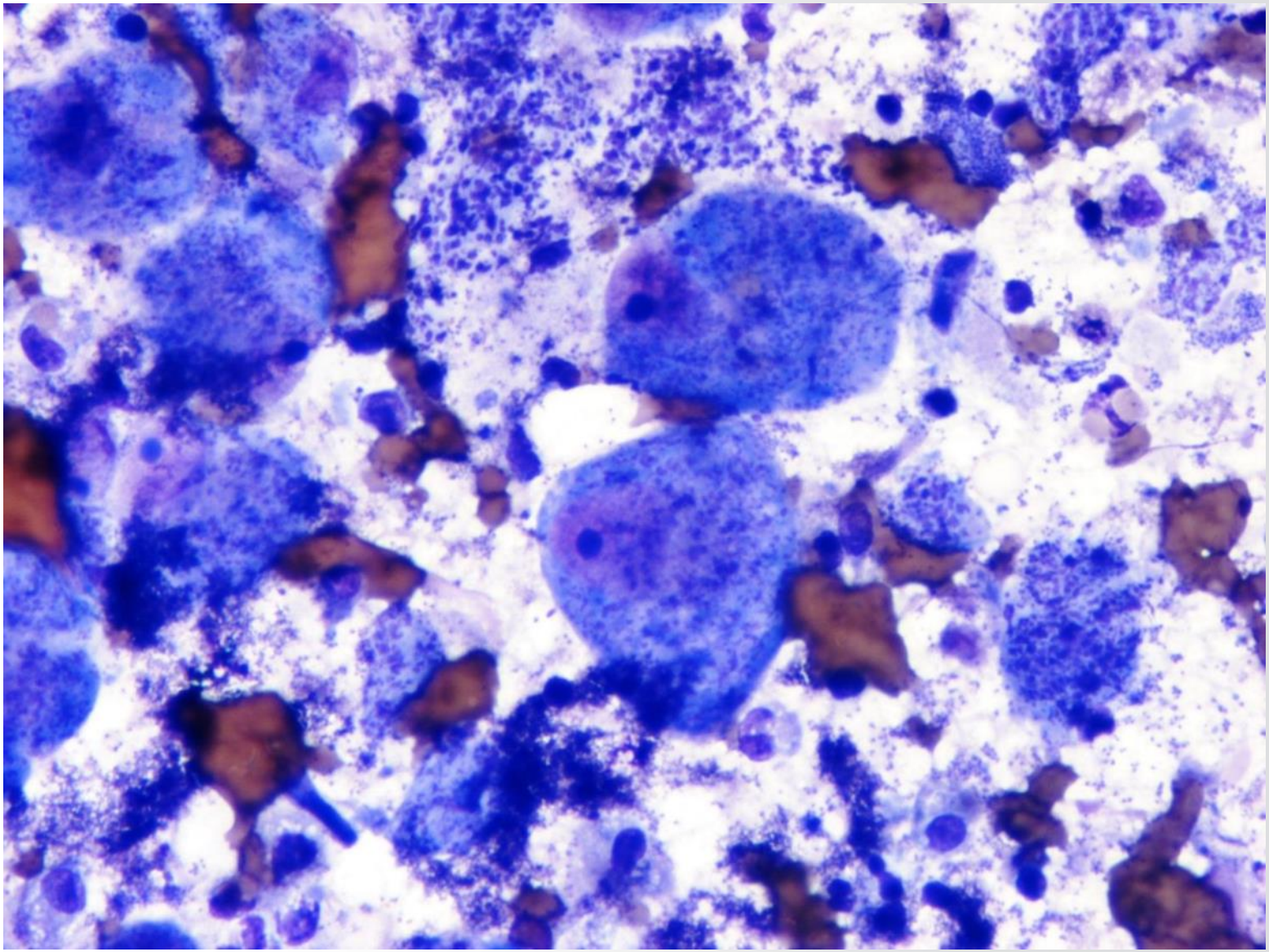
<http://bugguide.net/images/raw/MQ3RRQ9RJKTR0Q9RHQWRYKDQRQFRE0TQJKYQJKVRIQS060DQM0CQYKCQ20S0U0Z0SQFRMQ3RIQJR7Q.jpg>

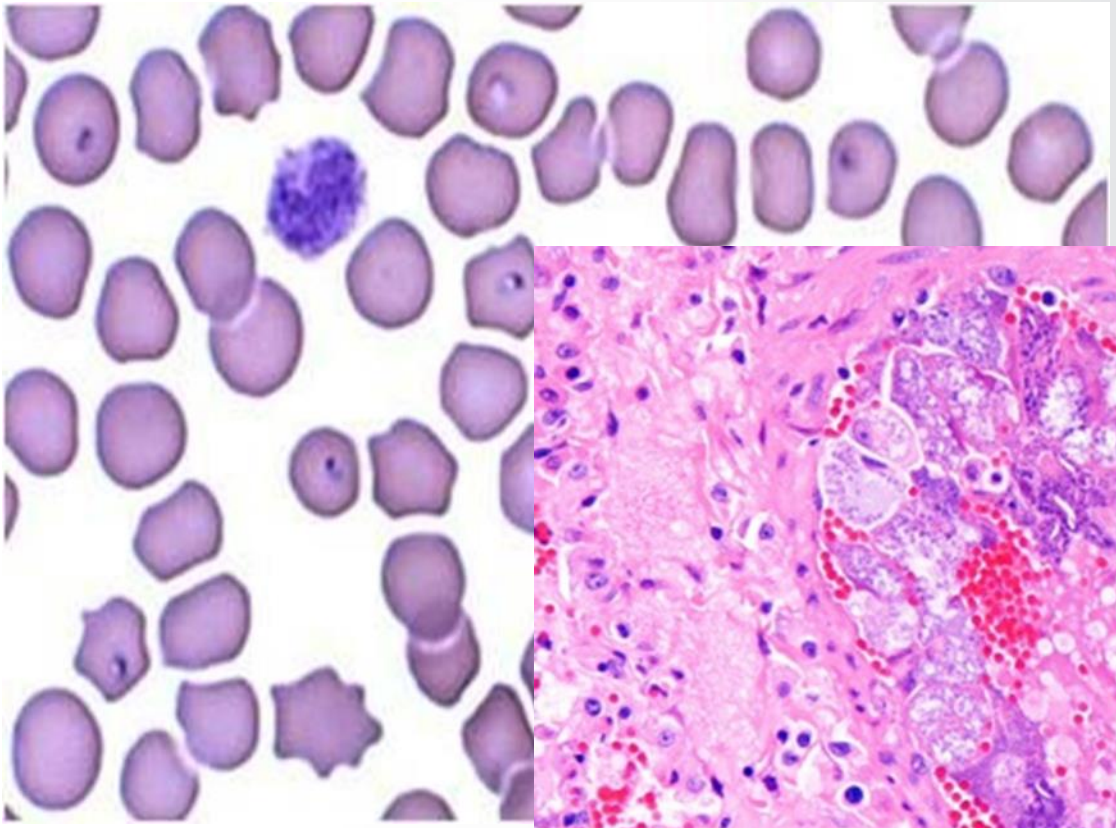
Deer Fly
(*Chrysops spp.*)

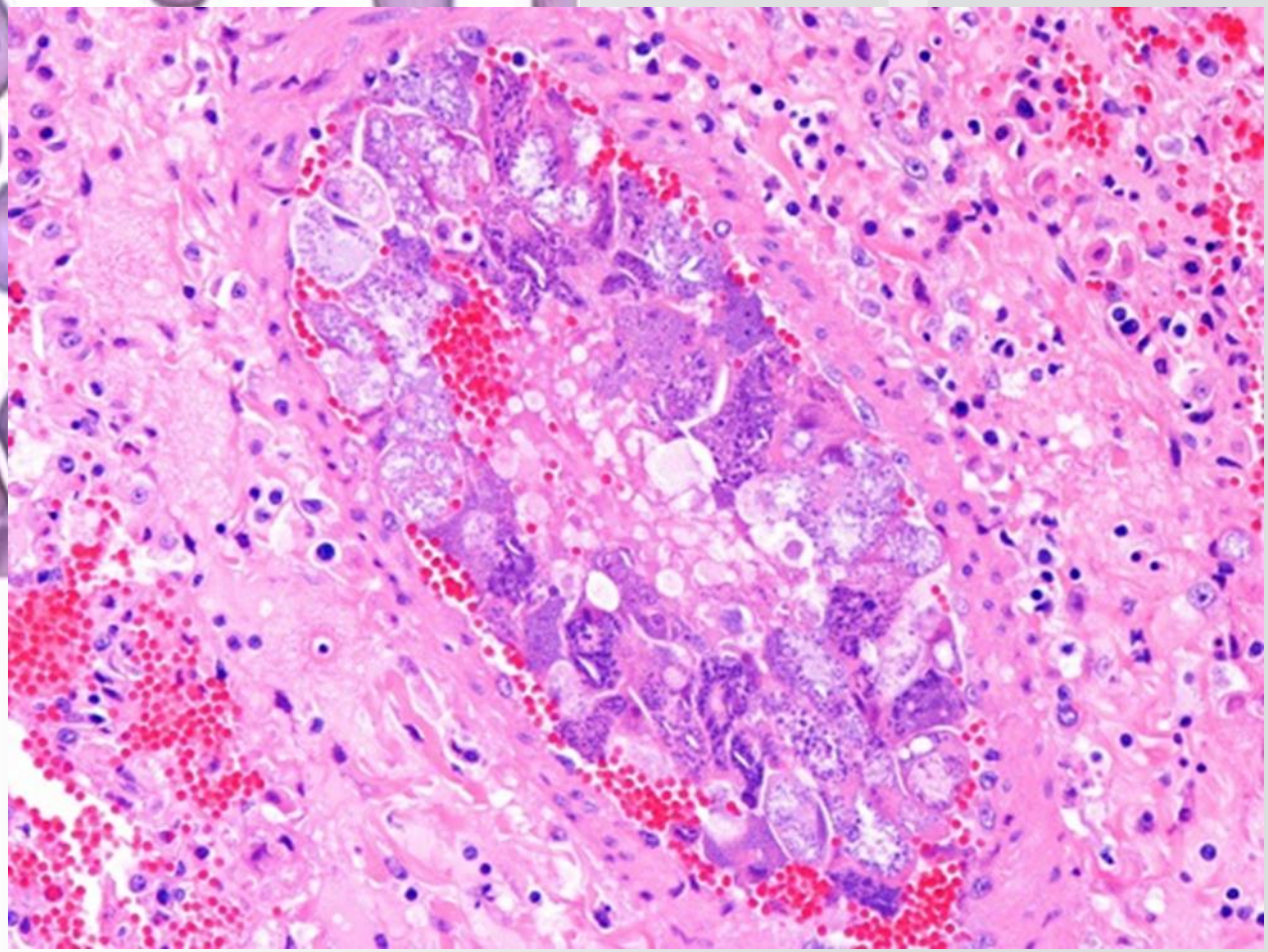
<http://cdn.orkin.com/images/flies/deer-fly-illustration_1500x1041.jpg>

Francisella tularensis

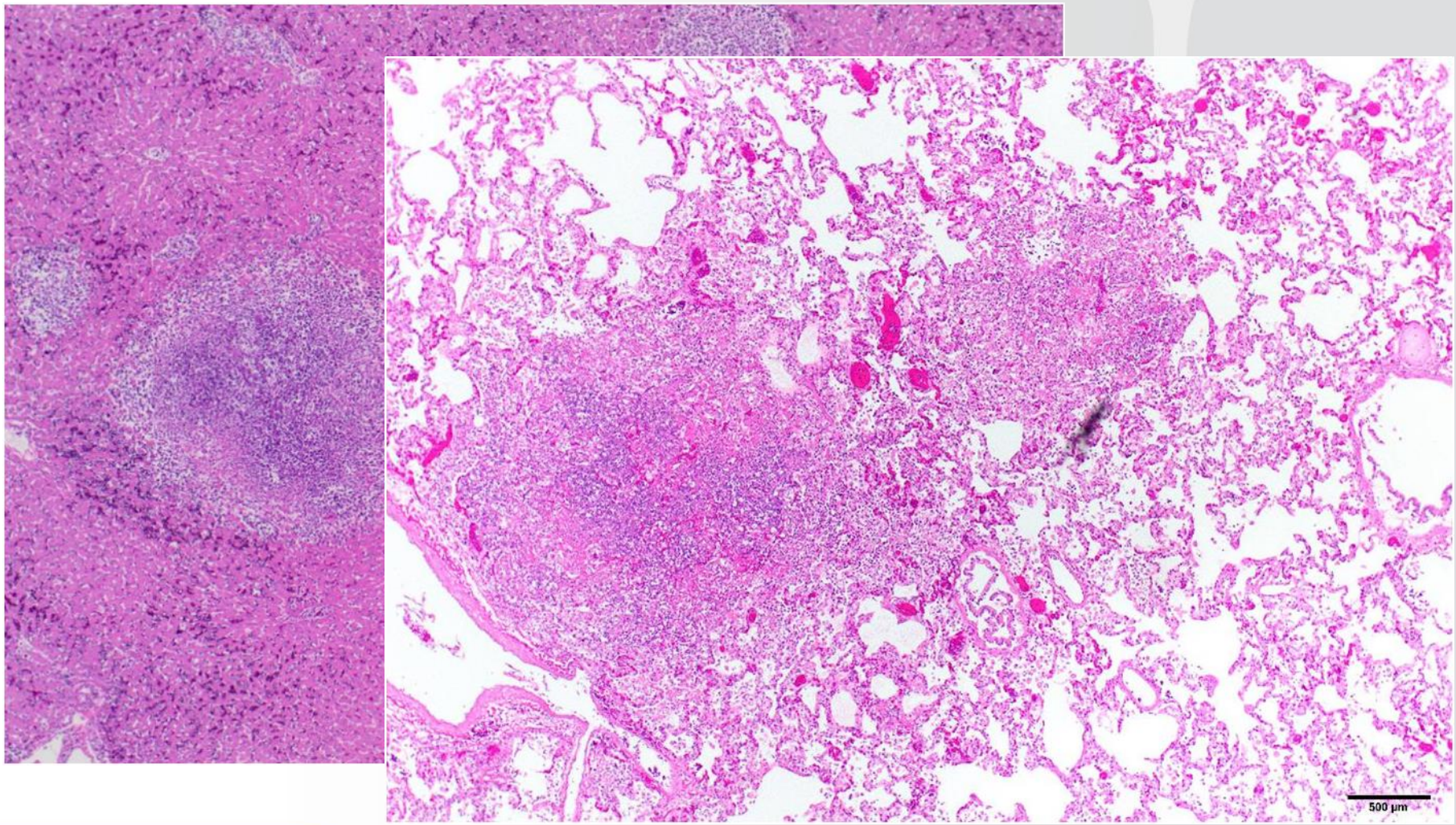
- Common history of fever, lethargy, dehydration, icterus, lymphadenopathy, death
- Same clinical presentation as Cytauxzoon felis
  - "Bobcat Fever", blood parasite, fatal in domestic cats
    - NOT ZOONOTIC





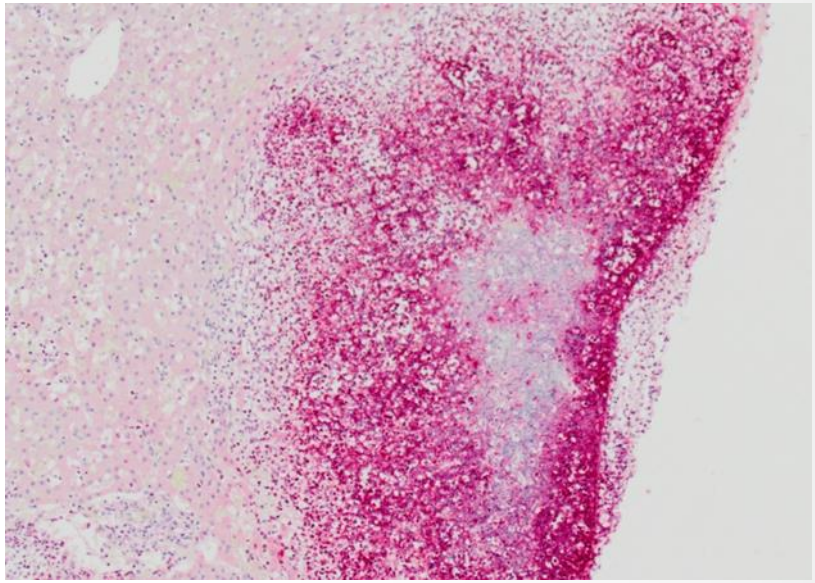


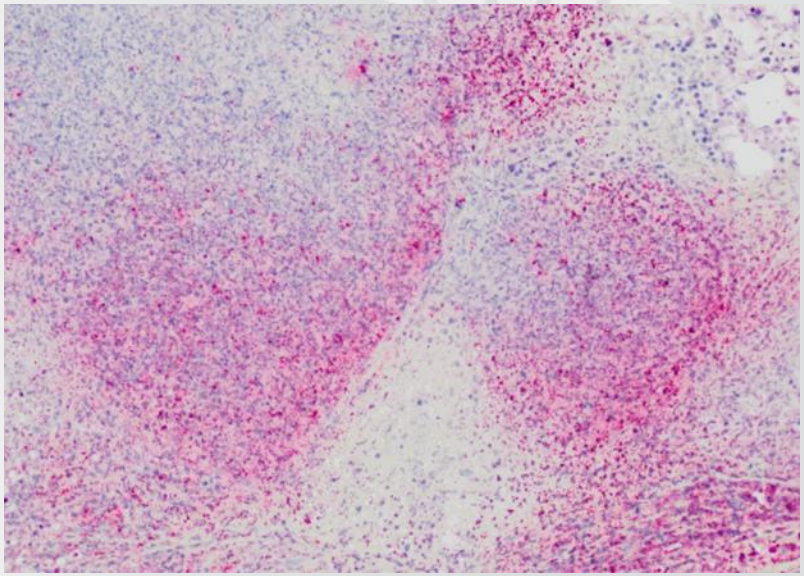
Liver & Lung



Francisella tularensis

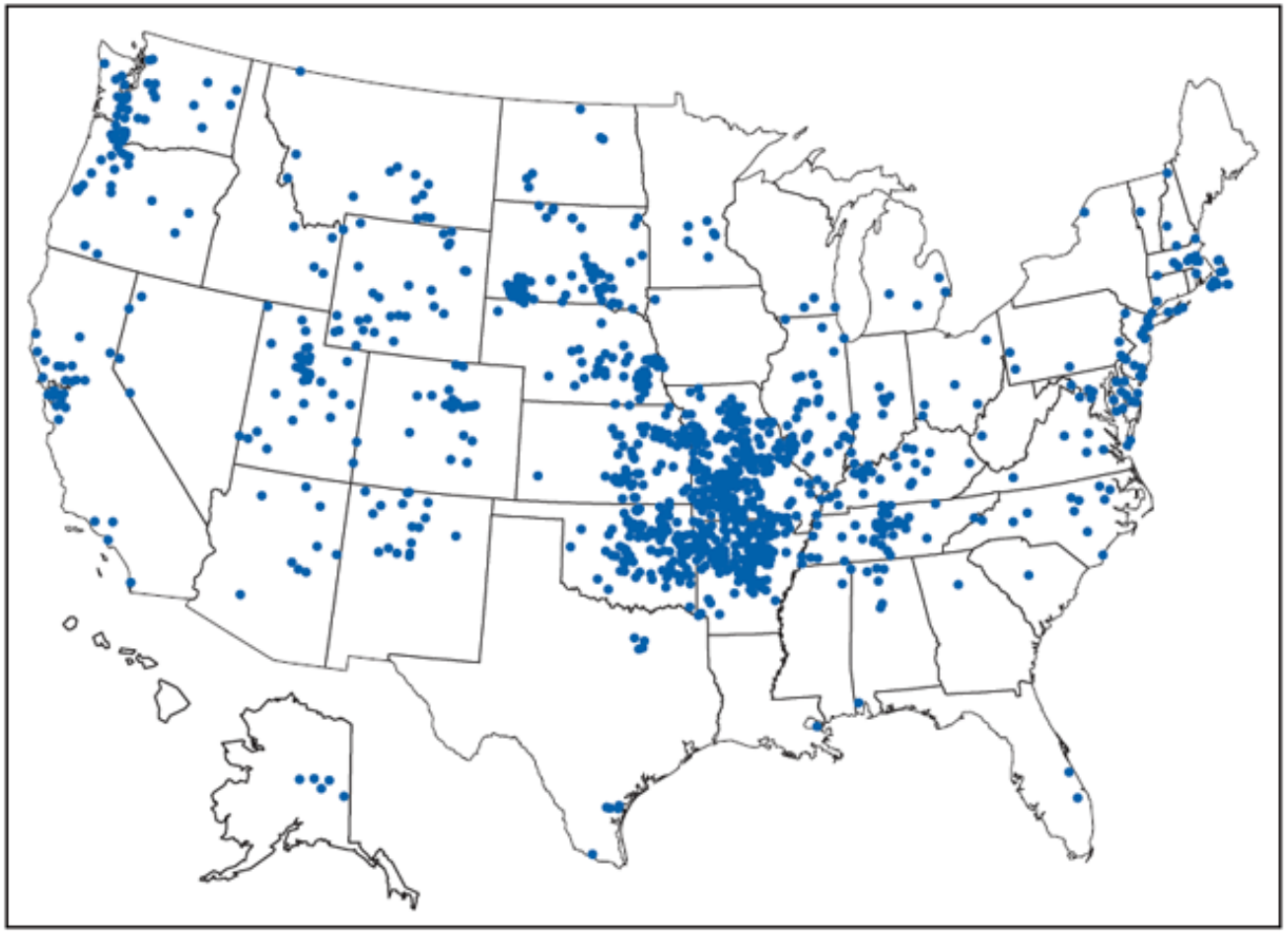
- KSVDL
  - Between 5-15 positive submissions/year
  - Culture and IHC diagnosis





CDC

FIGURE 3. Reported cases of tularemia — United States, 2001–2010*



* One dot is placed randomly within county of residence for each reported case.

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Zoonotic??

Capnocytophaga canimorsus

- Primary human pathogen associated with dog bites
- Asplenia, alcoholism
- Sepsis, meningitis, cellulitis, endocarditis, etc.
- Dog bite, close contact with animal, cat scratch
- Calls about culturing organisms for litigation
  - KSVDL does not culture or do strain evaluation
- *Pasturella multocida*
  - Cat bite wound infections

Zoonotic??

- Fifth Disease
  - Parvovirus
  - Canine, porcine, feline
    - Species specific
    - Not zoonotic
- Rocky Mountain Spotted Fever, Ehrlichia
  - Tick transmission
  - Not truly zoonotic
- Rotavirus
  - Pigs>cattle
  - Some reported zoonotic

Questions?

- Contact information
  - KSVDL website: www.ksvdl.org
  - Email: clientcare@vet.k-state.edu
  - Phone: 866-512-5650